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Survey Model

Implementation of The Mid-America Grain Study

NECC-ECC

21 Feb 2006

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Survey Model

Objective: **Incorporate the results found in Shippers Responses to Changes in Transportation Costs and Times, "The Mid-America Grain Study", into the framework of the economic system model developed during the UMR-IWW feasibility Study.**

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Mid-America Grain Study

- Product of Navigation Economic Technologies (NETS) of IWR completed in 2004
- Econometric analysis using survey results as input into a theoretical shipper's modal choice model
- Used to estimate arc elasticities of shippers' responses to both rate and time increases

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Mid-America Grain Study

- Changes in transportation rate and transit time both affect level of shippers demand for a mode or destination
- Arc elasticities decrease at a decreasing rate with larger percentage increases in both time and rate
- A large share of shippers is insensitive to changes in transportation rates and time

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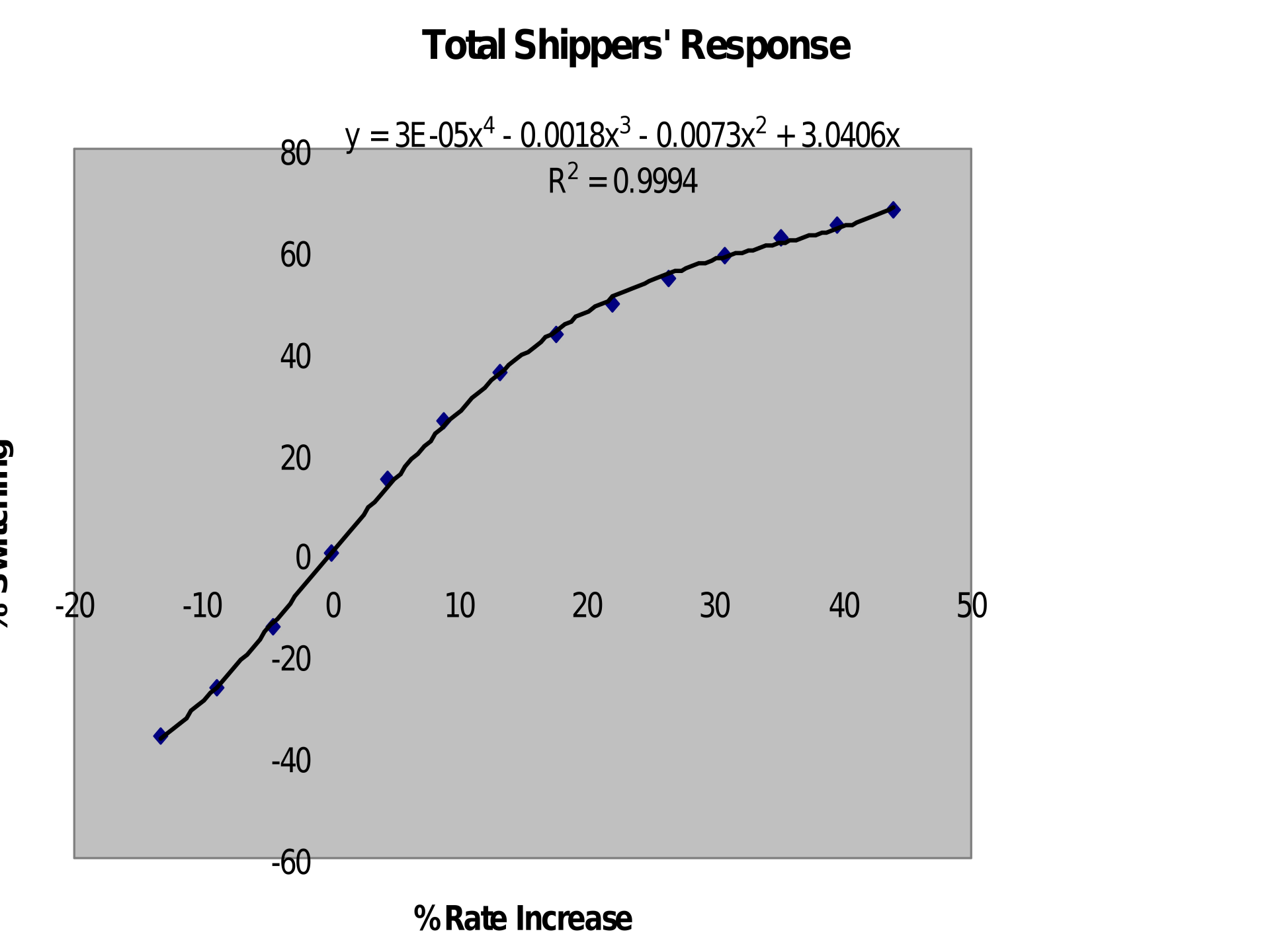
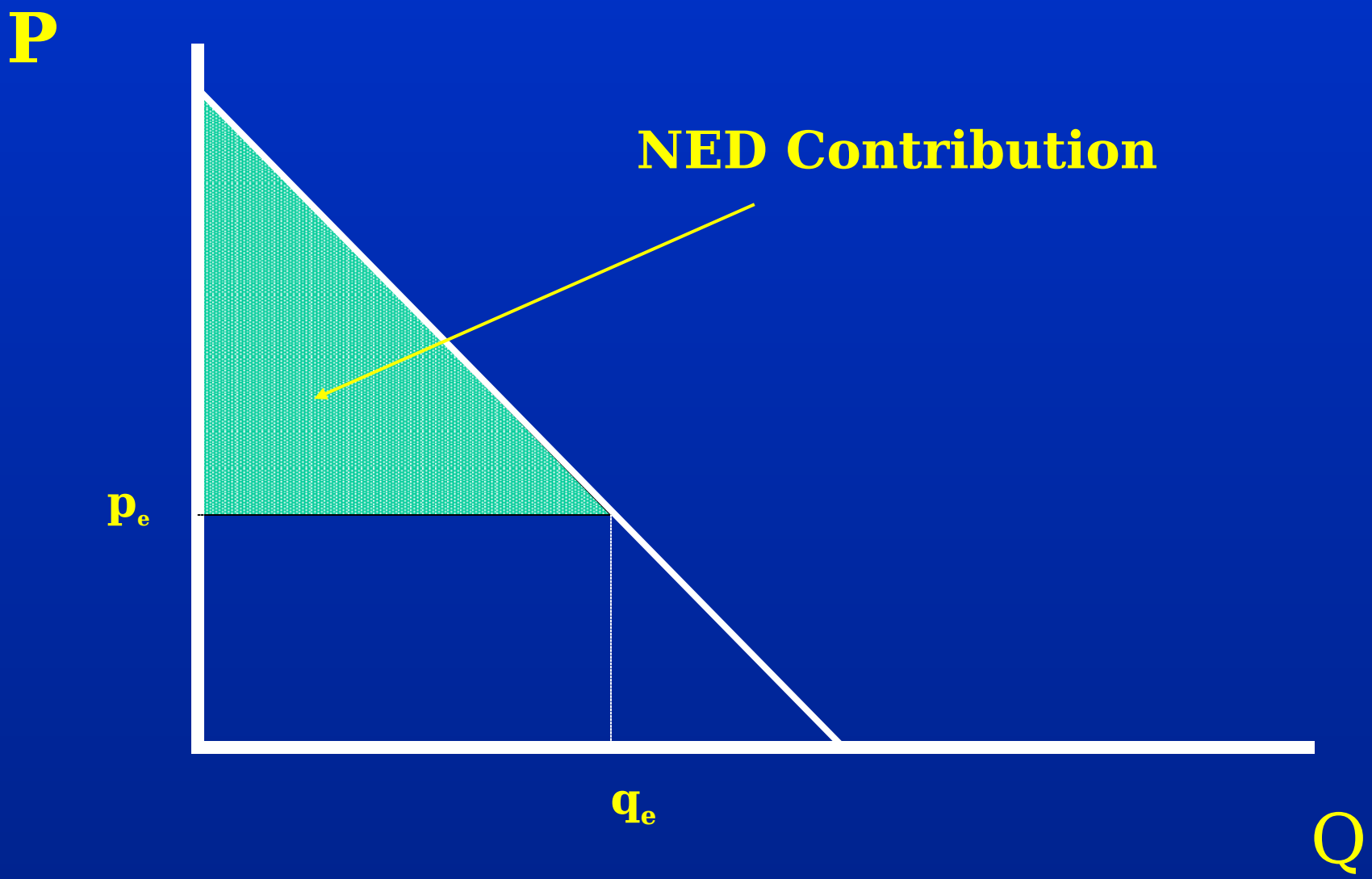
Shipper Response to Rate Change

Percent Rate Increase	Percent Switching
-13.20	*-35.85*
-8.81	*-26.37*
-4.40	*-14.54*
0.00	0.00
4.40	14.54
8.81	26.37
13.20	35.85
17.60	43.45
22.00	49.59
26.40	54.61
30.80	58.76
35.20	62.24
39.60	65.19
44.00	67.71


Total Shippers' Response
y = 3E-05x4 - 0.0018x3 - 0.0073x2 + 3.0406x
R2 = 0.9994
80
60
40
20
0
-20
-40
-60
-20
-10
0
10
20
30
40
50
% Switching
% Rate Increase


P
NED Contribution
p_e
q_e
Q

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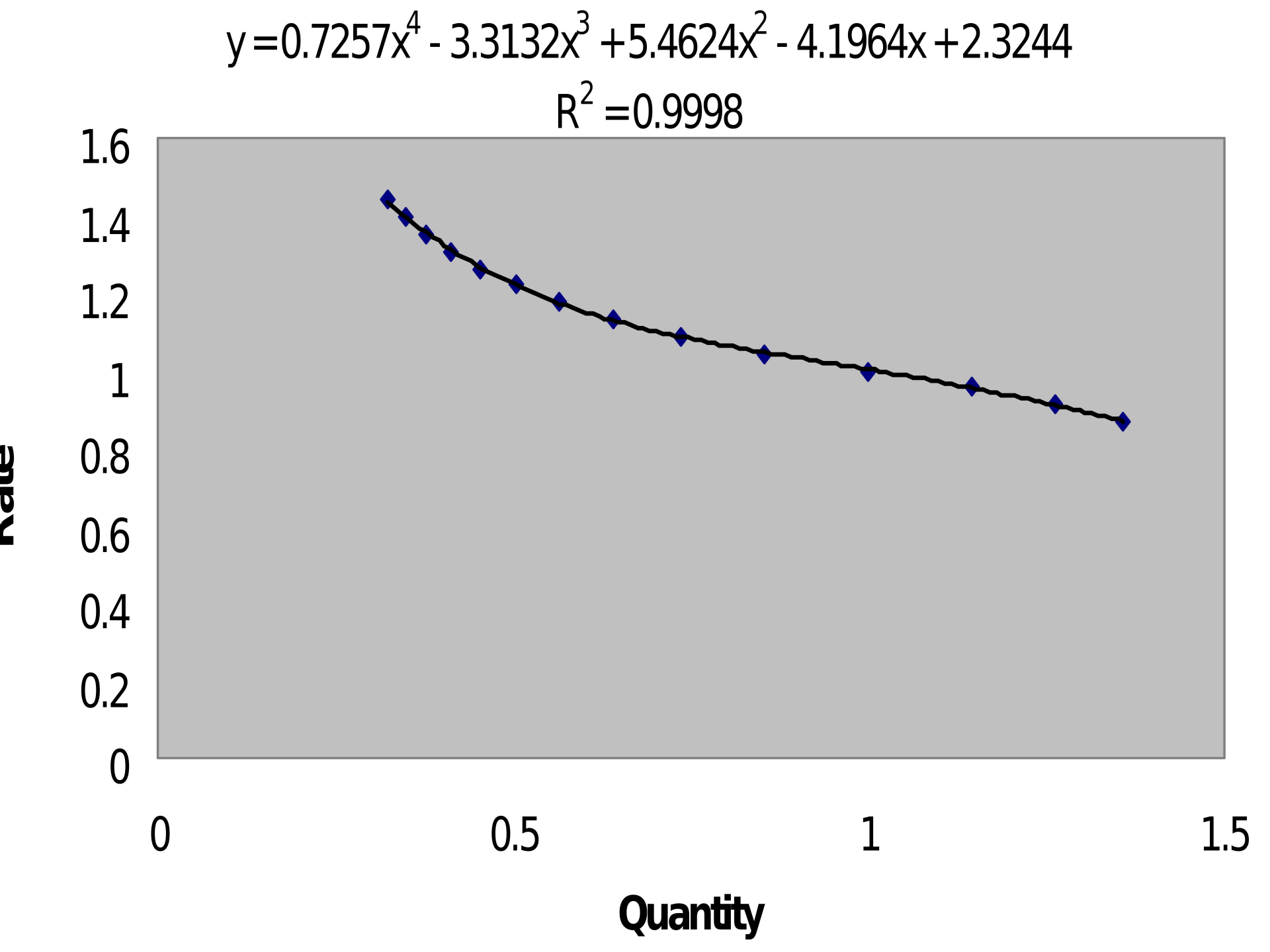
Shipper Response as Inverse Function of Rate

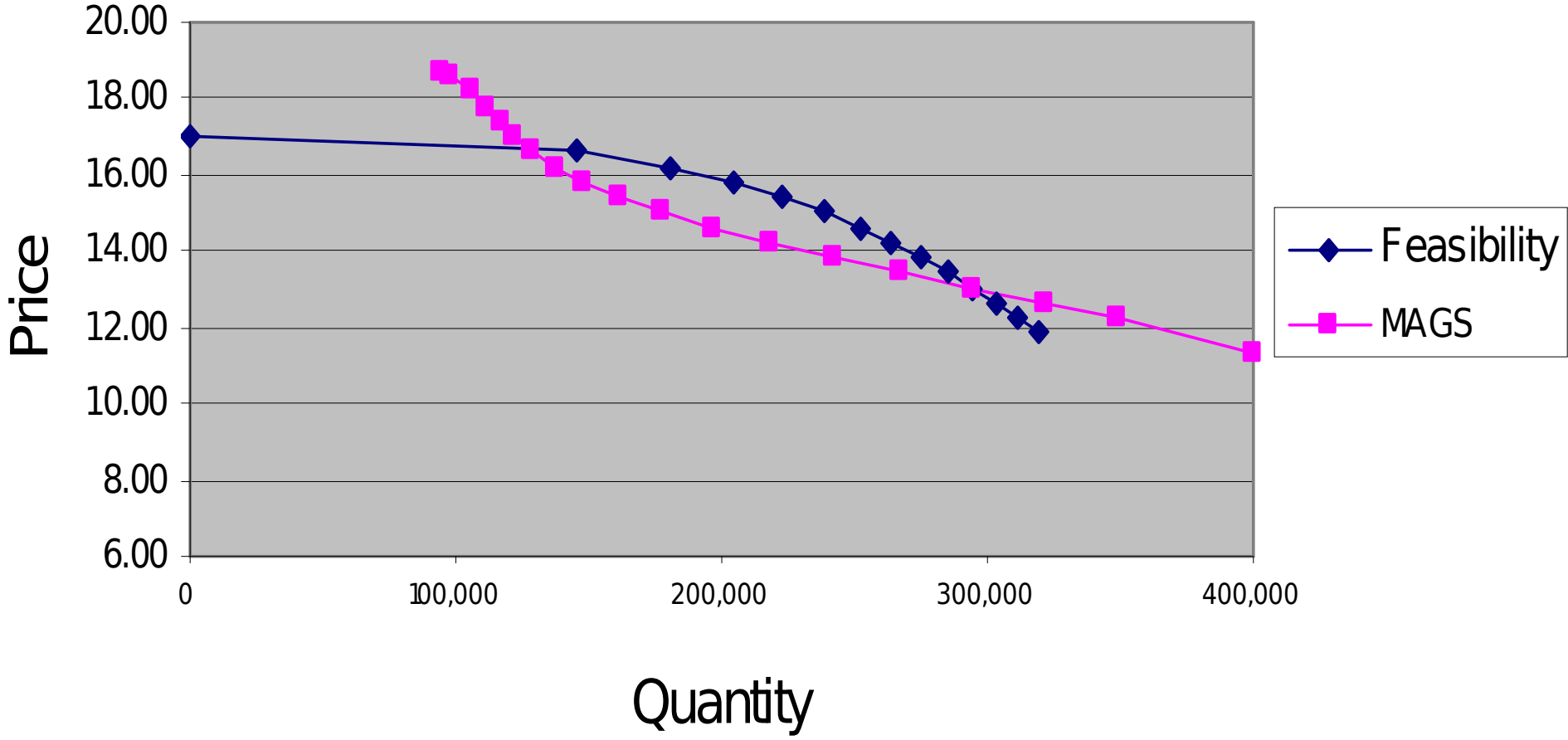
Proportion of Rate	Proportion of Shipments
0.868	*1.3585*
0.912	*1.2637*
0.956	*1.1454*
1.000	1.0000
1.044	0.8546
1.088	0.7363
1.132	0.6415
1.176	0.5655
1.220	0.5041
1.264	0.4539
1.308	0.4124
1.352	0.3776
1.396	0.3481
1.440	0.3229


y = 0.7257x4 - 3.3132x3 + 5.4624x2 - 4.1964x + 2.3244
R2 = 0.9998
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
0.5
1
1.5
Quantity

Demand Function Comparison

Feasibility Specification and Mid America Grain Study

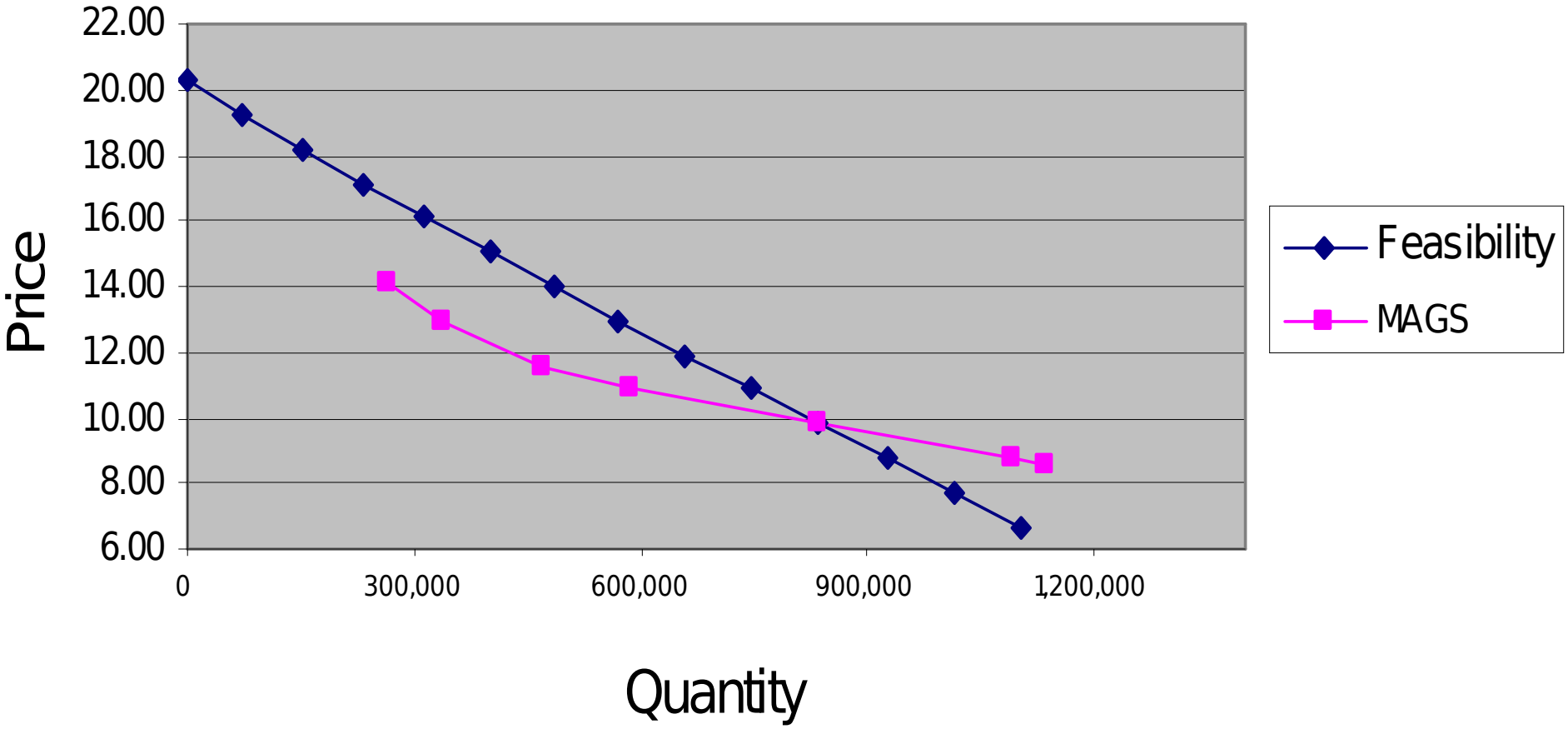
Selected Movement



Demand Function Comparison

Feasibility Specification and Mid America Grain Study

Selected Movement



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Partial Results Comparison

- **Shipper responses incorporated for *corn, soybeans, and wheat only*. All other commodities retained feasibility study demand specification**
- **All other model inputs unchanged from feasibility study (base traffic, traffic forecasts, transportation rates)**
- **New formulation compared to "central scenario" and "most favorable" traffic, with "lower bound" elasticity, for a large scale structural alternative**
- **Incremental transportation cost savings are lower with the new formulation**

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DETERMINING SYSTEM CAPACITY TO ACCOMMODATE GRAIN FLOWS BY RAIL TO THE PORT OF ST. LOUIS

The Louis Berger Group, Inc.

January, 2006

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Study Directive

Determine system capacity to accommodate grain flows by rail to the Mississippi River at St. Louis

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Study Tasks

1. Meet with IWR
2. Conduct research
3. Conduct interviews with major grain handlers and railroads
4. Draft report
5. Meet with IWR, obtain comments
6. Finalize Report – Tasks 2-3
7. Develop forecast model framework approach
8. Meet with IWR, obtain comments
9. Finalize Task 8 Report

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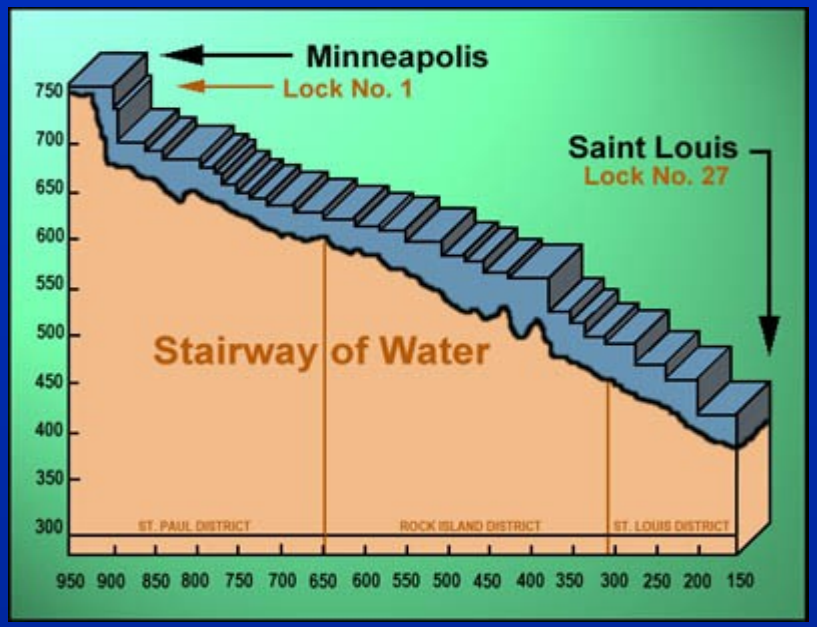
Grain Flows to St. Louis

Basic Study Findings

- 90% of all grain moving to St. Louis for barge loading arrives by truck, not rail.
- Rail is more important to the Upper Mississippi, but mainly in winter, when the River is iced-over.
- St. Louis' peak loadings occur December through March, since it is the most northerly barge terminal that stays ice-free.



(photo source ACE, IWR)

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Grain Flows to St. Louis

Basic Study Findings: Rail vs. Barge St. Louis to New Orleans

- **Rail cannot compete with barge from St. Louis to New Orleans (NO) because:**
  - **NO allows mid-stream transfer of grain from barge to ocean-going ships**
  - **Barges allow a 5-day window for delivery, making it easy to mesh with ship schedules**
  - **Rail only allows a 16-hour window, then charges apply**
  - **Export terminals in NO have poor rail unloading facilities, and little storage room.**

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Grain Flows to St. Louis
Decreases Since Peak in 1997

- Grain flows to St. Louis have decreased 25-40% since 1997, because:
  - Information flow to farmers and grain brokers has improved, leading to a more perfect market, where sellers can select freely among many alternative markets.
  - More grain is being used domestically than ever before – due to ethanol and methyl ester production, and a paradigm shift in rail transportation.
  - The market share of grain exports has stayed flat, even as grain production has increased.

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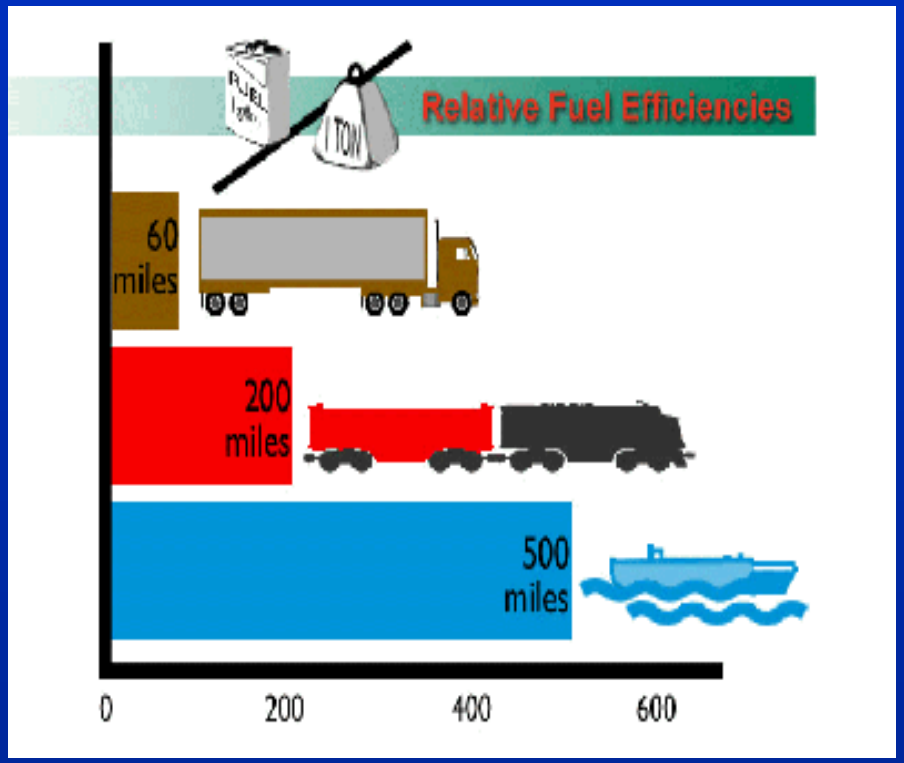
Grain Flows to St. Louis

Railroads Improved Access to Domestic Markets

Unable to compete with barges for direct moves to NO, the railroads have aggressively introduced intervening opportunities, lowering costs with dedicated equipment on shuttle trains that move grain directly to livestock/ poultry markets in Texas or the Southeast, or to ethanol plants. They have redirected grain away from export.

In Illinois alone, BNSF Railway has built six new shuttle terminals, each moving up to 50 million bushels of grain to the Texas/ Oklahoma livestock area, freeing up that local grain to move to California or the Pacific Northwest for export.



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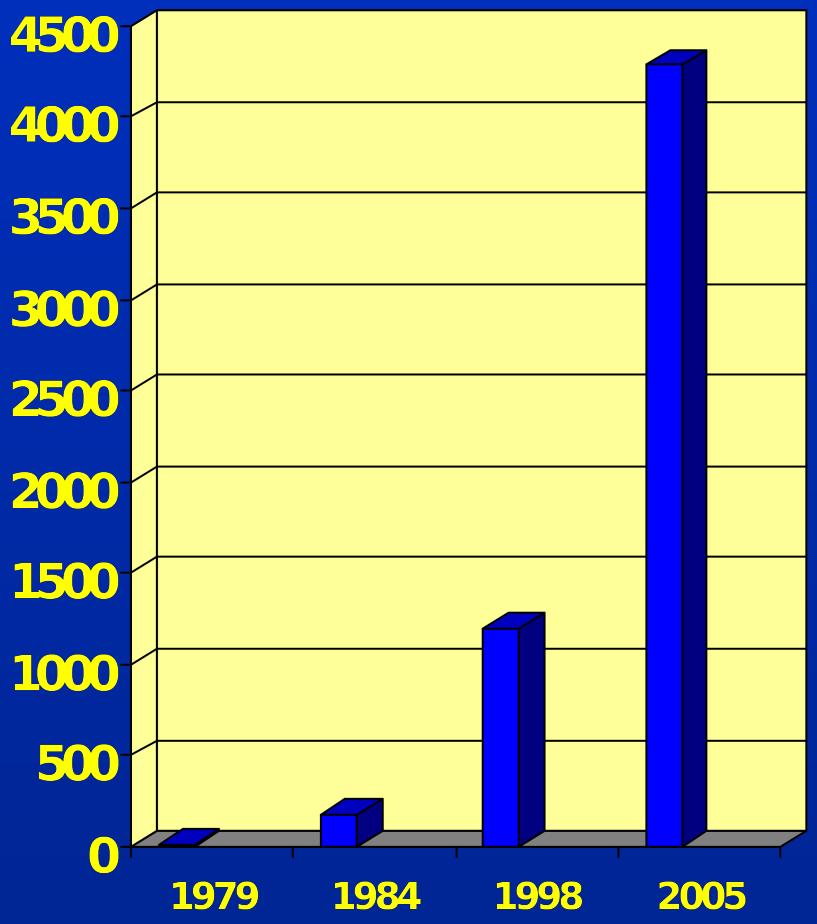
Grain Flows to St. Louis

Added reasons for decline in St. Louis-based exports

The exponential increase in ethanol production

- Only 10 million gallons of ethanol were produced in 1979.
- This grew to 50 million gallons in 1980 (in less than 10 facilities)
- By 1984 163 facilities produced nearly 200 million gallons.
- The Renewable Fuels Association estimates 2005 total production at 4.2 billion gallons.
- 1.8 billion gallons of production capacity is under construction.
- High gas prices, low corn prices, processing facilities with low-cost transportation support the trend.



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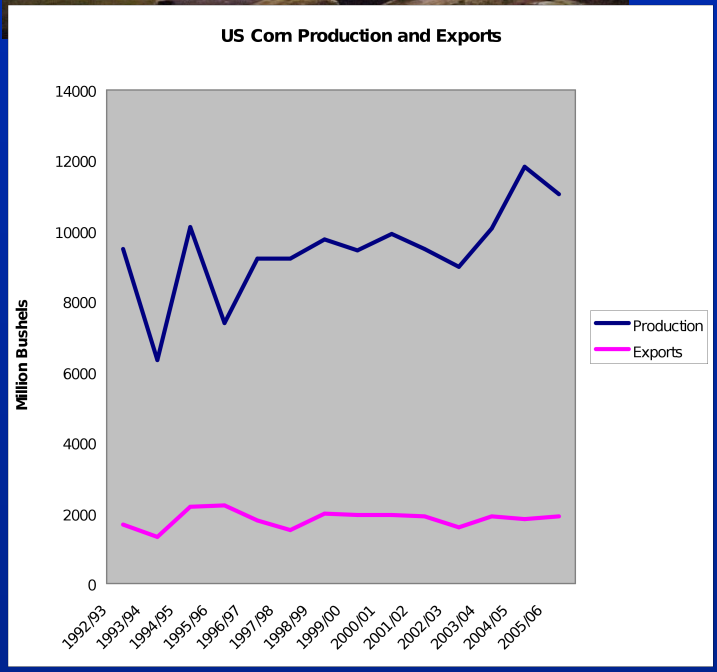
Grain Flows to St. Louis
Added Domestic and International Market Insights

- In 2004, ethanol consumed 1.26 billion bushels of corn – 11% of the US total crop, plus 11% of grain sorghum. In 2005, it will be 13%.
- A modern dry mill converts one bushel of corn (56 pounds) into 28 gallons of ethanol and 17 pounds of livestock feed. A wet mill produces even more valuable by-products.
- Corn exports are about 18% of the total crop –see graph.
- The European market is down due to the genetically-modified grain issue, political issues, and increased production in Eastern Europe and in South America.
- South American production, especially of soybeans, also competes in Asian markets.



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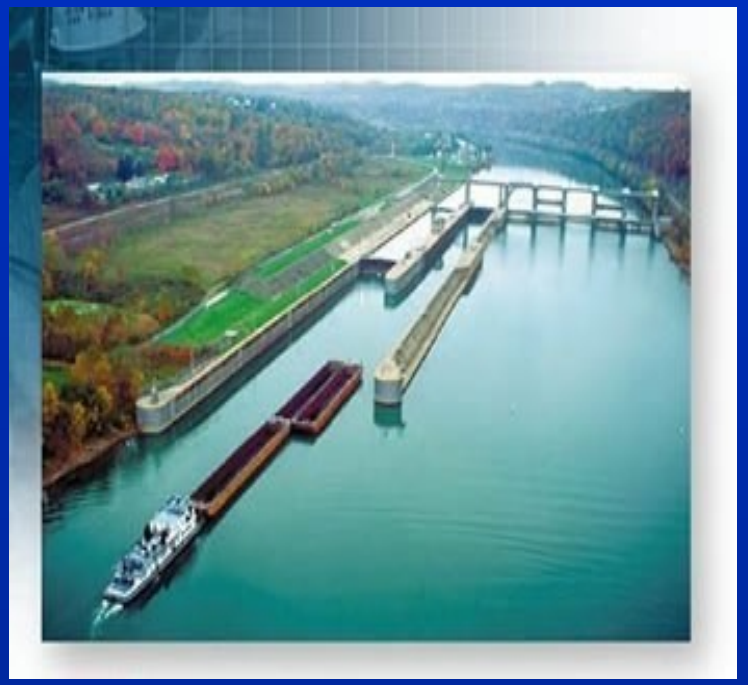
Grain Flows to St. Louis

Short-Term Issues with Barge Supply and Pricing

- Barge rates were too low for several years, and both the scrap and export markets were up, leading many operators to sell their barges for scrap or to South America, as Brazil, especially, builds up its inland waterway system.
- The recent hurricanes also took some barges out of service (175 loaded barges were stuck at NO, unable to unload, plus others were damaged).
- All together, some 2500 barges have "left the market," raising prices. In 2004, the Criton Corp. listed only 11,572 covered hopper barges on the entire Mississippi/ Illinois/Missouri/Ohio river system.
- St. Louis is currently charging 350% over the base price for moving grain – in 2004, this surcharge never exceeded 400%, but it has already been over 900% in 2005, and the same is expected in 2006. Anything >150% drags down the market.



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Grain Flows to St. Louis

Major Conclusions

There are currently no capacity constraints on rail movement of grain to St. Louis. Instead, rail shipments there are restricted by intervening opportunities, and by infrastructure and barge competition issues in New Orleans.

Grain movements to export through St. Louis are threatened by barge pricing, by South American competition, by the genetically- modified grain issue, and most of all, by increasing domestic usage, mainly due to ethanol production.

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Comments on this Study and the PowerPoint Presentation

Please provide us comments on this important study by March 17, 2006. Copies of report and power point presentation are available. Also the report and presentation can be found in the January 2006 issue of Netsnews, netstream@corpsnets.us. Look under 2006 Symposium Materials.

Send comments to:

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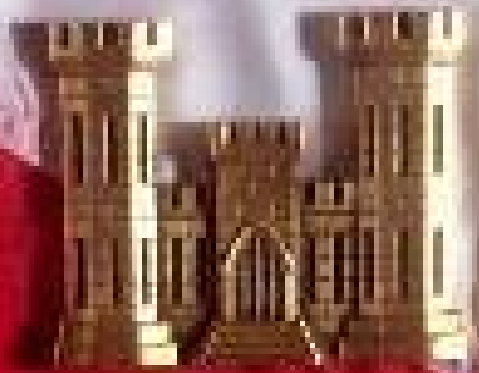
Presentation to the

NETS Symposium 2006
Salt Lake City, Utah



by

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Economic and Environmental Analysis Branch
Rock Island District Corps of Engineers

January 2006

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Event Studies – UMR Locks 27

- The Locks and Dam 27 project is located at Mississippi River mile 185.5, between the confluence of the Missouri River (RM 195.5) and downtown St. Louis, Missouri (RM 179-180).

- The project has two parallel locks along the left descending bank: a 1200’ x 110’ main chamber and a 600’ x 110’ auxiliary chamber. The twin locks are situated at the southern end of an 8.4 mile long man made canal.

- The navigation pool is 27.8 miles long and covers 13,000 acres. The project was put into service in 1953.

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UMR Locks 27 and Chain of Rocks Canal

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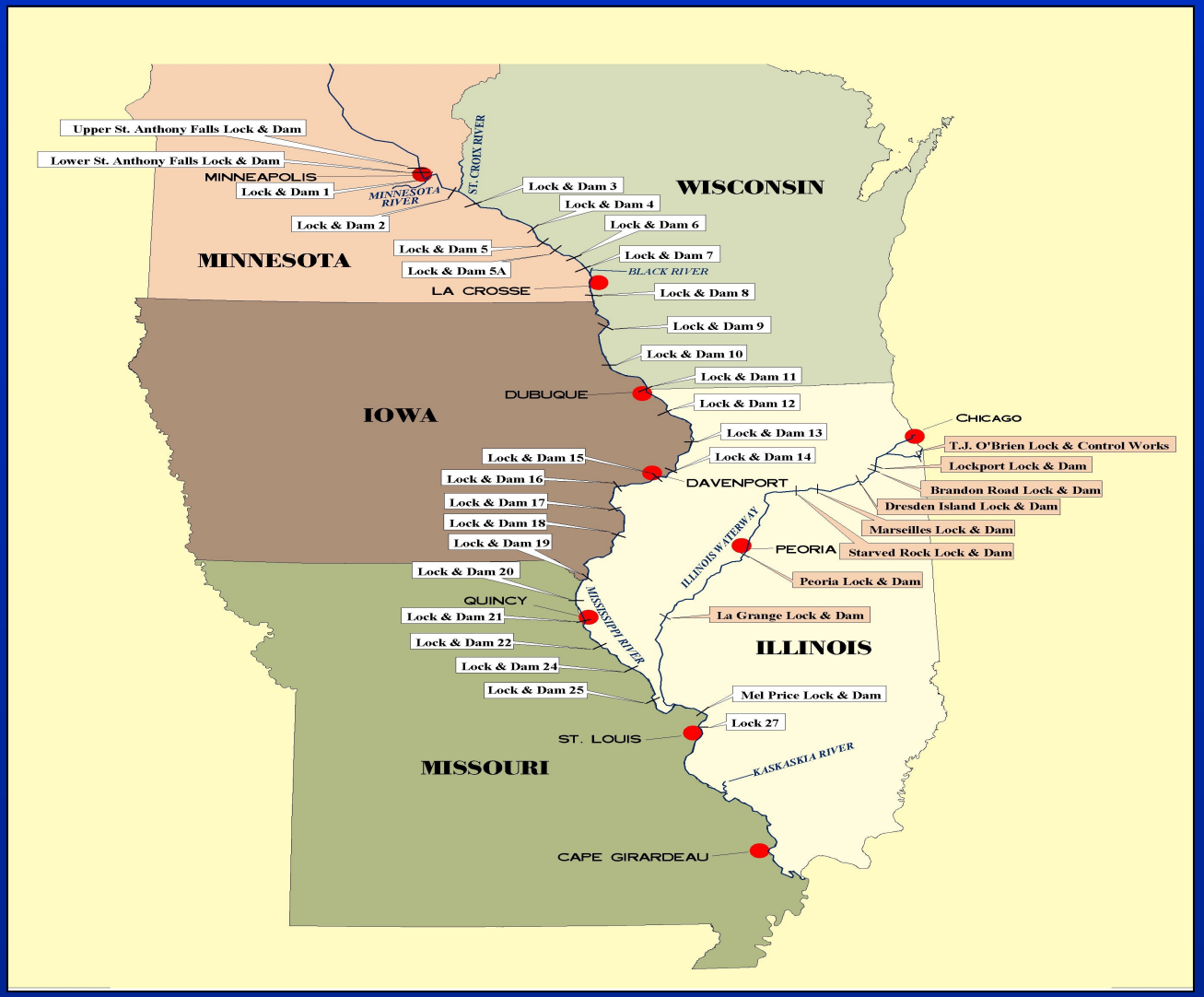
UMR-IWW NAVIGATION SYSTEM



UMR-IWW NAVIGATION SYSTEM

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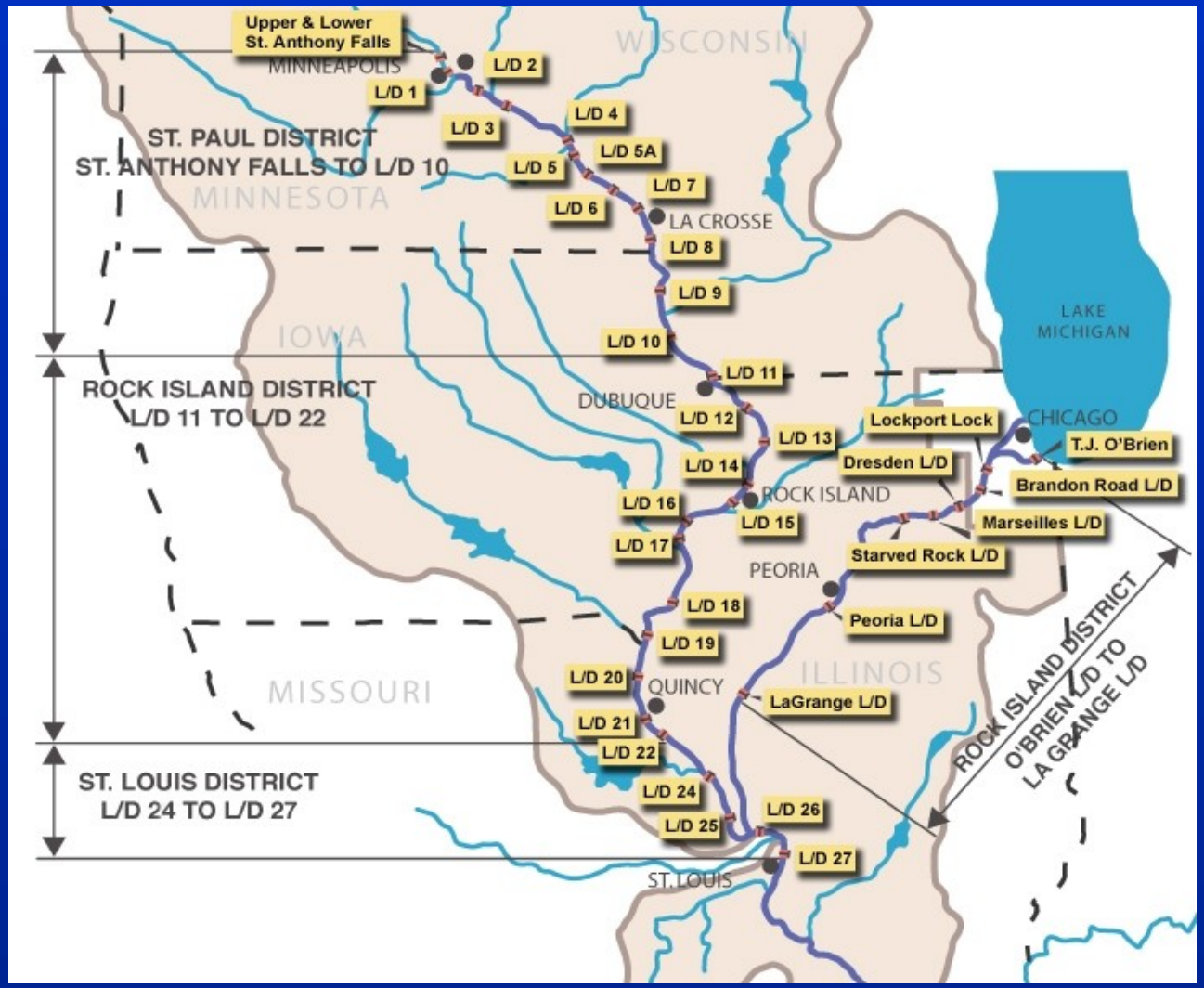

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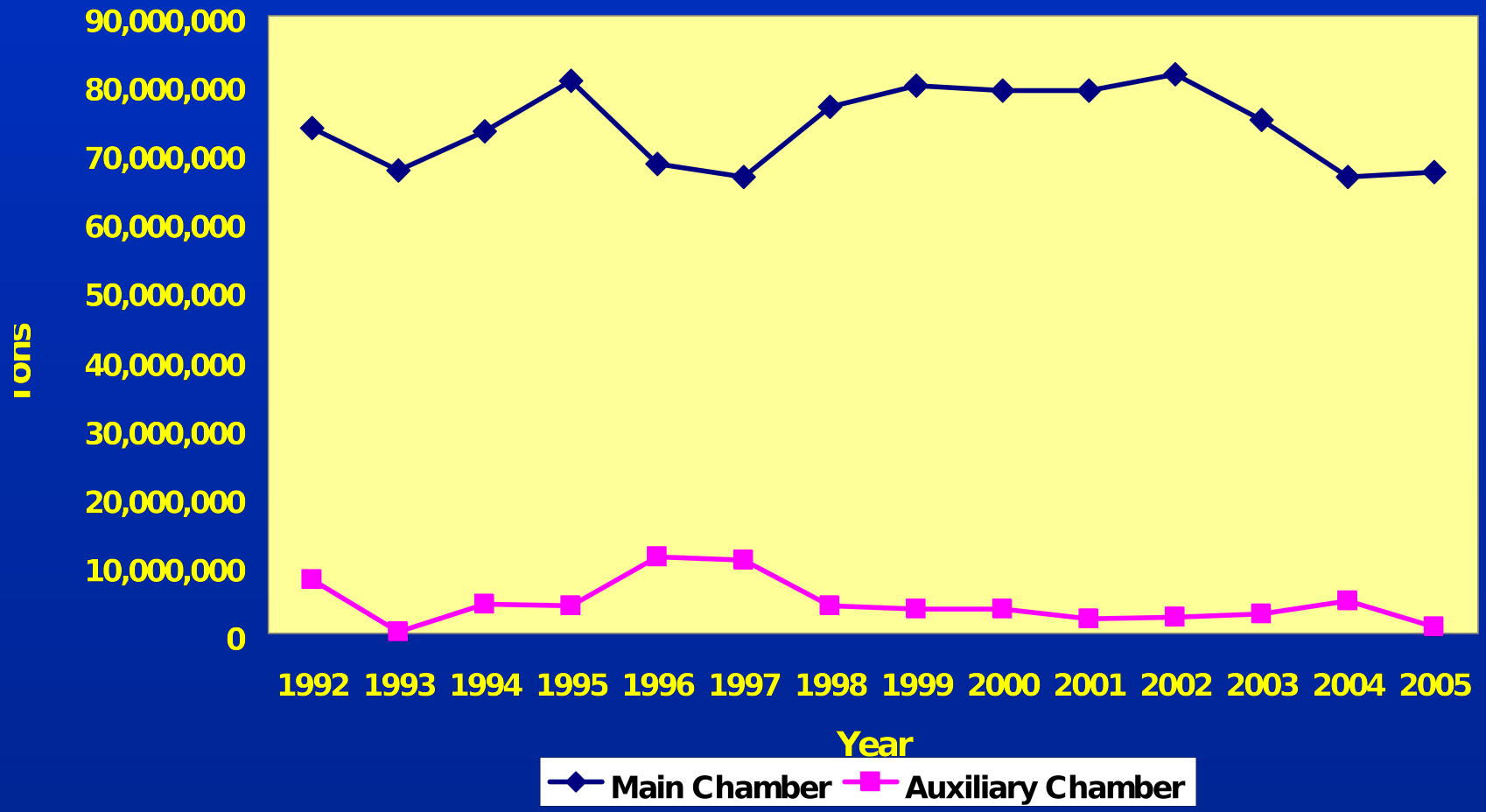
Locks 27 Tonnage 1992-2005



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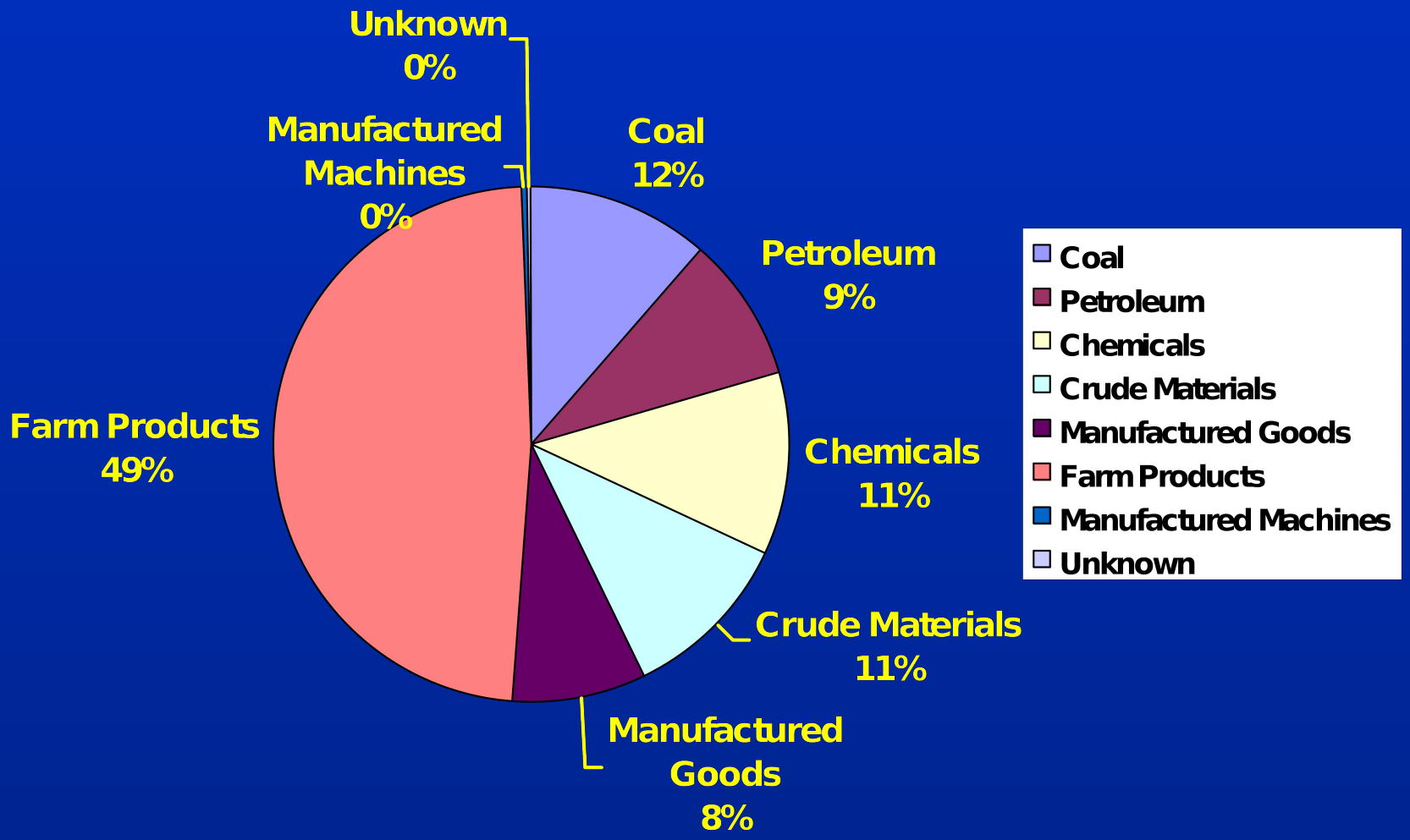
Lock 27 Main Chamber in 2004 (66.5 million tons)



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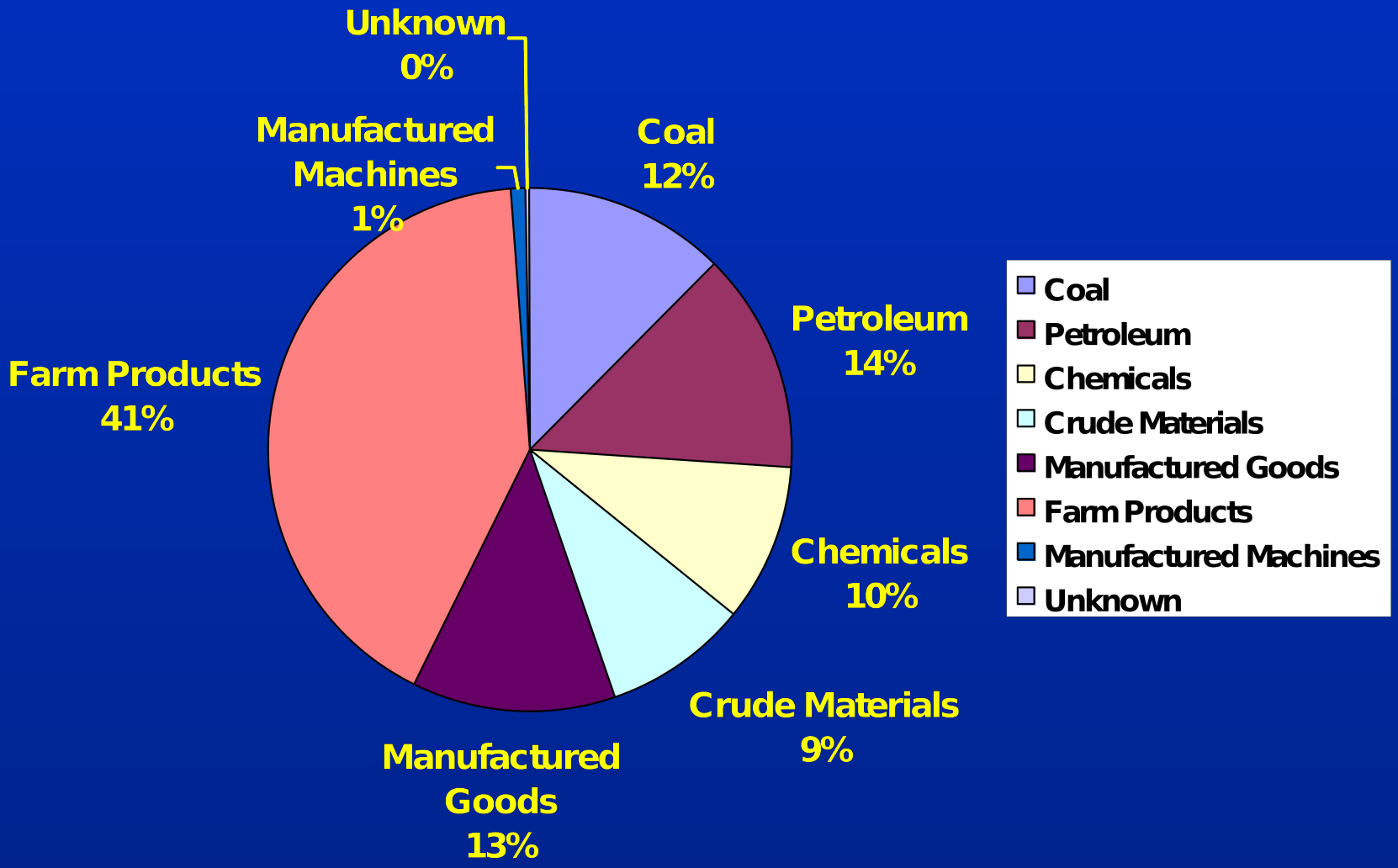
Lock 27 Auxiliary Chamber in 2004 (4.7 million tons)



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Event Studies

- 26 July – 10 August 2004
  - Closure of main lock chamber at Lock 27, Mississippi River mile 185.0 for maintenance repairs. Auxiliary lock chamber remained open and available to river traffic during this period.

- February – March 2005
  - Surveys of shippers and carriers were conducted regarding impacts of this closure. Those surveyed included:
    - Shippers who moved more than 50,000 tons thru Locks 27 in 2003. A total of 206 companies were surveyed, which accounted for about 80 % of the total traffic.
    - Carriers with a frequency of 50 or more trips through Locks 27 in 2003, and carriers who transported more than 1,000 tons through Lock 27 in 2003. A total of 22 companies were surveyed .

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Event Studies

- **Purpose of survey was to identify total costs incurred, and operational changes made by industry associated with the closure event.**

- **The overall response rate was 39 % for the shippers survey and 68 % for the carriers survey, which was largely the result of the follow up telephone campaign and contacts made with industry groups (MARC 2000 and the Waterway Council, Incorporated).**

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Event Studies

- **Shippers**
  - **Over 70 % reported no change in procedures was necessary. This was credited to advance notification and the auxiliary chamber remaining in service, minimizing disruption.**
  - **About 10 % decided to stockpile product and wait for traffic to clear; about 6 % switched to all-overland mode for product delivery .**

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Event Studies

- **Carriers**
  - **All but one of the responding companies indicated that notification of the scheduled closure was adequate.**
  - **Majority of the companies reacted to the closure by having towboats remain in queue, or by breaking tows to lock through the auxiliary lock.**
  - **Several companies participated in industry self help.**

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Event Studies

- **Cost of closure**
  - **Shippers – Majority indicated no additional cost incurred.**
  - **Carriers – Estimated $3.9 million cost of closure, mostly attributed to delay cost and lost revenue.**

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Analysis of OMNI Data

- Because tows were compelled to lock thru the auxiliary lock, average processing times nearly doubled.
- Delays (amounting to 15,000 tow hours) greatly exceeded normal levels. Maximum delay to single tow was 104.6 hours.
- After the main chamber re-opened, it took about 94 hours for the queue to dissipate.
- The number of tow arrivals per day increased during the period following announcement of the closure, and decreased during the closure.

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Future Surveys

- A Planned Replacement of gate operating machinery is scheduled for the Lock 27 main and auxiliary chambers.

- The auxiliary chamber was closed for eight weeks from 3 October- 27 November 2005, and the main lock chamber will be closed for seven weeks between 3 January and 27 February 2006.

Schedule for Future Surveys

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- **April – June 2006**
  - **Mail Shippers and Carriers surveys and do a telephone follow up with the companies contacted.**
  - **Analysis of OMNI data relative to main and auxiliary lock closure at Lock 27.**
  - **Report including write-up on both the 2005 and 2006 surveys will be available in June 2006.**

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UMR Locks 27 and Chain of Rocks Canal